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SENSITIVITY OF LIGHT CLUSTER AND NUCLEON YIELDS ON ASYMMETRY ENERGY

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Abstract

Collisions between neutron rich heavy nuclei at intermediate energies can be used to extract information about the asymmetry energy within the nuclear equation of state. One possibility is to examine the n/p ratios for nucleons emerging from these collisions. If nuclear gas and liquid phases coexist in a collision, then the n/p ratio is higher in the gas phase, and this excess reflects the nuclear asymmetry energy. Since neutrons are hard to detect, however, it would be useful to establish a relation between t/3He and n/p ratios. Then the more easily detected light clusters could be used to deliver insight into the asymmetry energy. The Boltzmann-Uehling-Uhlenbeck (BUU) transport model follows the Monte Carlo technique to simulate the motion of nucleons and clusters during a collision. The BUU model was used to generate data for 124Sn+124Sn and 112Sn+112Sn collisions at 50 MeV per nucleon for various asymmetry energies, isospin and impact parameters. The n/p and t/3He ratios have been calculated in two different ways, following collisions within the BUU model, and using the coalescence model. Both methods show that the ratios are sensitive to impact parameter, isospin, and asymmetry energy. However, the coalescence can be adjusted to provide a better agreement with yields measured during experiment at the NSCL. It was found that a correlation exists between t/3He and n/p ratios, and this correlation is also sensitive to the asymmetry energy.